



FOREST HEALTH REVIEW

November 2011



Damage in Washington County from an EF3 tornado that touched down for 18 miles in late April. This was the strongest among more than a dozen tornadoes during an outbreak that affected many parts of the Commonwealth this spring. Photo by Bill Miller, VDOF assistant regional forester.

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The big news this year was the discovery of thousand cankers disease and the walnut twig beetle in and around Richmond, which I discuss in the opening article below. The other big story was the weather – not drought this time, but severe storms, such as the spring tornado outbreak and Hurricane Irene. While not catastrophic in terms of forest damage, these disturbances were certainly significant. As we learned from Hurricane Isabel back in 2003, the footprint from these major storms can carry over for many years, even decades. On a positive note, gypsy moth activity remains extremely low, with another wet May ensuring that a resurgence of this pest will be further delayed by at least a couple of years. While the emerald ash borer continues to spread dramatically in adjacent states, the widespread trapping survey revealed no new infested counties in Virginia this year, which I found a bit surprising. While this is good news, it will likely be short lived. A few flare-ups of southern pine beetle have occurred in some locations, but overall, bark beetle activity has remained relatively low across the Commonwealth. We've also had the wettest August-September I can remember in a long time, and enter the fall fire season in pretty good shape as of this writing. I hope you find this issue to be useful and informative.

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THOUSAND CANKERS DISEASE OF BLACK WALNUT IN VIRGINIA

Thousand cankers disease (TCD) of black walnut first came to my attention a few years ago when it was being reported as a major killer of black walnut in many municipalities across the western U.S. Eastern black walnut is not native to the west so mortality was confined to urban and landscape trees. The disease, (*Geosmithia morbida*) and its major vector, the walnut twig beetle (*Pityophthorus juglandis*), are believed to have originated throughout the southwestern U.S. (CA, AZ, NM, TX) and Mexico, throughout the ranges of four species of western walnuts. Presumably the twig beetle and the associated fungus made the jump to eastern black walnut as planting of this species became more widespread in the west. The disease was first detected in Utah and Oregon in the 1990s, followed by New Mexico (2002), Colorado (2003), California



A gathering of personnel from VDOF, Virginia Department of Agriculture and the USDA Forest Service discuss diseased black walnuts in eastern Hanover County, Va.

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(2008), Washington (2008), Arizona (2009) and Idaho (2009). In July 2010, fears that the beetle/fungus would find their way to the native range of eastern black walnut were realized when TCD was detected in Knoxville, TN.

During 2011, new TCD finds began to materialize in the east, first in the vicinity of Richmond, Va., in June, followed by the Philadelphia area shortly thereafter.

By June, the Virginia Department of Agriculture and Consumer Services (VDACS) had, with numerous other states, already initiated a formal survey for TCD across the Commonwealth. Before the survey was very far under way, VDACS State Plant Pathologist Norman Dart was contacted by Bartlett Tree Experts regarding a black walnut exhibiting suspicious-looking symptoms. A landowner on the southern outskirts of Richmond had asked Bartlett to remove a large walnut tree from his property that was mostly dead except for one branch. The Bartlett staff who came to the property had some training and were alert enough to recognize the tell-tale but tiny holes created by the walnut twig beetle, and the associated cankers characteristic of TCD. Samples submitted to Norm tested positive for TCD, while tiny bark beetles collected from galleries within the cankers were confirmed to be the walnut twig beetle by James Labonte, an entomologist with the Oregon Department of Agriculture.

By July, notification was made statewide that VDACS had enacted a quarantine on black walnut for Henrico and Chesterfield counties and the City of Richmond based on ongoing surveys that revealed additional infestations. Based on additional survey work extending into fall, Hanover, Goochland and Powhatan counties were added to the list as well. According to the quarantine, regulated articles include any life stage of the walnut



A black walnut with thousand cankers disease in a neighborhood on the southern outskirts of Richmond.



Tiny exit holes on black walnut twigs indicate attack by the walnut twig beetle. Photo by Norman Dart, Virginia Department of Agriculture.



Numerous cankers from *Geosmithia morbida* are exposed after slicing bark off a black walnut twig that was attacked by the walnut twig beetle. Photo by Norman Dart, Virginia Department of Agriculture.

twig beetle or the *Geosmithia morbida* pathogen, as well as "all plants and plant parts of the genus *Juglans* including but not limited to nursery stock, budwood, scionwood, green lumber, firewood and other material living, dead, cut or fallen including stumps, roots, branches, mulch and composted and uncomposted chips." Specific exemptions include, but are not limited to "nuts, nut meats, hulls, processed lumber (100% bark-free, kiln-dried, with squared edges), and finished wood products without bark, including walnut furniture, instruments and other items derived from the genus *Juglans*." VDACS can issue certificates or limited permits that allow for movement of regulated articles if certain conditions are met. Further details of the quarantine regulations can be found at <http://www.vdacs.virginia.gov/plant&pest/pdf/tcd.pdf>.

Based on my own observations from the field, TCD and walnut twig beetle are not too difficult to diagnose once a sample is in hand. Initially one should look for yellowing foliage which progresses to brown wilted foliage, followed by branch dieback and mortality. With a dead or dying branch or twig sample in hand, look for numerous tiny bark beetle entrance and exit holes along the bark surface. Where holes are found, make a shallow cut into the bark and cambium with a pocket knife to expose the small, chocolate brown cankers on the surface of the sapwood. Typically these cankers are smaller than a dime and often are riddled with tiny galleries made by the twig beetle. Many cankers

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UPDATES

WEATHER

It has been a warm season, with occasional heat waves and occasional mild periods. Overall, it's been a very stormy and wet year, too, with mild drought occurring periodically in some locations – particularly eastern Virginia and areas around the Roanoke Valley – during summer. In much of Virginia, it's been the wettest August-September period I can remember, thanks in large part to Hurricane Irene and Tropical Storm Lee. Dry, cooler air finally moved in by early October, but generally the fall fire season is not looking as dire as it has around this time in years past when little rain had fallen during the previous two months.

The table below presents the percent of average monthly precipitation and average degrees above (+) or below (-) monthly average temperature for each of nine geographic regions in Virginia (defined below). For monthly temperatures, a '0' indicates average.

SOUTHERN PINE BEETLE (SPB)

As forecast by our spring trapping season, SPB activity continues to be generally low across the Commonwealth, although localized activity has been picking up in a few areas. To date, we have approximately 200 reported acres killed for 2011, with the majority of that acreage coming from a couple of locations where spots went undetected and unreported and had been growing for the last couple of years. They were noticed during aerial survey flights by our staff, but it is very puzzling why nobody reported them to the Department of Forestry. Both of these locations have many similarities – maturing pine stands that were never thinned, sold by industry and subdivided. One infested area in western

Table 1

	SW	CW	NW	NP	CP	SP	NCP	SCP	ES
APR Precip	110 to 200%	150 to 250%	150 to 250%	110 to 200%	90 to 150%	100 to 200%	50 to 90%	25 to 130%	50 to 70%
APR Temp	+2 to +6	+2 to +6	0 to +6	+2 to +6	0 to +6	+2 to +4	+2 to +4	+2 to +4	+4 to +6
MAY Precip	110 to 150%	110 to 150%	90 to 130%	90 to 150%	130 to 150%	110 to 150%	70 to 130%	70 to 150 %	70 to 110%
MAY Temp	-1 to +1	-1 to 0	0 to +1	0 to +2	-1 to +1	-1 to +2	0 to +2	0 to +2	+1 to +2
JUNE Precip	50 to 130%	50 to 70%	50 to 130%	25 to 70%	50 to 150%	50 to 90%	50 to 130%	50 to 110%	25 to 130%
JUNE Temp	-2 to +4	0 to +4	0 to +4	+2 to +6	0 to +4	0 to +4	+2 to +4	+2 to +4	+4 to +6
JULY Precip	70 to 150%	50 to 130%	50 to 90%	50 to 70%	50 to 130%	50 to 130%	50 to 200%	70 to 200%	130 to 200%
JULY Temp	-2 to +4	+2 to +5	+2 to +4	+4 to +7	+2 to +6	+2 to +4	+2 to +4	+2 to +4	+2 to +4
AUG Precip	25 to 110%	25 to 150%	90 to 150%	50 to 150%	50 to 150%	25 to 130%	150 to 300%	150 to 300%	200 to 300%
AUG Temp	-2 to +2	0 to +2	0 to +2	0 to +2	0 to +2	0 to +2	0 to +2	0 to +2	0 to +2
SEPT Precip	130 to 200%	130 to 150%	130 to 200%	130 to 300%	130 to 200%	130 to 300%	150 to 300%	110 to 300%	70 to 130%
SEPT Temp	-3 to +3	-1 to +2	-1 to +1	-1 to +2	-1 to +3	0 to +2	0 to +2	+2 to +4	+1 to +3

SW = Southwest (Cumberland Gap to Abingdon to Blacksburg and Galax)

CW = Central West (Roanoke to Staunton)
NW = Northwest (Staunton to Winchester)
NP = Northern Piedmont (Loudoun/DC to Greene/Spotsylvania)
CP = Central Piedmont (Albemarle/Goochland to Bedford/Nottoway)
SP = Southern Piedmont (Campbell/Lunenburg to Henry/Mecklenburg)
NCP = North Coastal Plain (King George/Northumberland to Chesterfield/Newport News)
SCP = South Coastal Plan (Dinwiddie/Brunswick to Virginia Beach)
ES = Eastern Shore

Hanover County is among a large neighborhood with many homes and only one way in and out. As you drive through the neighborhood, hundreds of dead trees are visible along the edge of the road. The other area is on the Powhatan-Chesterfield County line and is similarly subdivided but not quite as populated with homes.



This is a very unfortunate situation for the folks living in these communities. When you have new homes surrounded by an unmanaged pine stand, the clock is ticking on how long that stand will remain viable and healthy. It may be a couple of decades, but more likely it will be sooner than that if trees have already reached maturity. Bark beetles are designed to invade these stands and start taking out the weak trees, of which there are many in overstocked stands. In particular, SPBs have the unique ability to build up their numbers in weakened trees to the point where they are able to mass attack healthy trees. In this way, SPB spots that start off small can quickly get out of control. If spots are not quickly halted by cutting them out along with a buffer strip, or a clearcut of the stand if too many trees are involved for spot disruption, the only thing that stops this spot growth is if they run into a barrier like a major road or a hardwood stand where there are no more host pine trees to attack. While there is some active cutting going on, I fear it will not be quick or thorough enough to prevent continued spread of southern pine beetle across the landscape. Quick action is complicated by numerous property ownerships, but SPB does not respect property boundaries. I'm afraid if a viable number of infested trees are left behind and not removed before next spring, this area could possibly bust out into a full-blown outbreak. I'll be keeping a close eye on it.

Planners and developers who build homes and communities in such environments should be better educated about the potential problems, or even catastrophes that might befall homeowners who think they just moved into paradise and will always look out upon big beautiful pine trees from their back yards. Suddenly, they'll be living amidst a clearcut wondering "what just happened?" It's a disservice to folks who are generally not well educated about trees and forests and who just want a nice place to live. Furthermore, living in an overstocked pine stand with one way in and out can, in the worst case scenario, be a threat to life and property if a fire starts on a red flag day. Pine resin is highly flammable and, therefore, pine stands support some of the most severe blazes. If a fire were to start somewhere amidst these homes under hot, dry, windy conditions, folks could lose their homes and possibly even their lives if they are unable to get out in time or their escape route is overcome by smoke and flames. It's also an extra risk for the firefighters who have to prioritize the protection of lives and property. We need more registered Firewise Communities, and quite often, these communities need to be "beetlewise," too.

UPDATES

landowner's property in New Kent County, Va., on a site that received a first commercial thinning under our Logger Incentive Program during the last year. The Forest Service awarded the landowner, logging company and consulting forester involved with the job a plaque in recognition of the importance of each of these respective constituencies in maintaining good forestry practices. The effort was designed to bring recognition to what good forest management is all about and why it is important.



In western Hanover County, an active SPB spot expanding in multiple directions, even while clearcutting is occurring. The multiple property ownerships are greatly complicating swift and decisive action to slow this spread. Photo taken by Dave Terwilliger, VDOF forester.

SPB PREVENTION PROGRAM

We are approaching 40,000 acres treated under the SPB Prevention Program in Virginia. A majority of this acreage is from cost-sharing with landowners for pre-commercial thinning, but also includes longleaf pine restoration and first commercial thinnings via our Logger Incentive Program.

The USDA Forest Service SPB Prevention and Restoration Program has reached a milestone this year in having treated one-million acres across the South. In commemoration of this milestone, we held a ceremony with USDA Forest Service personnel at their request at the end of October. It was held on a private

On another note, a study by Virginia Tech Forest Economics Professor Jay Sullivan and his graduate student, Adam Watson, was completed this spring examining the economics of Virginia's SPB Prevention Program and landowner's knowledge and perceptions of the program. The focus was exclusively on pre-commercial thinning, which represents the majority of actions funded under the program. The overall conclusions reached were that 1) cost-sharing has a positive and significant overall effect on willingness to participate. If cost-sharing is rescinded, policy makers can expect 64 percent less pre-commercial thinning; 2) There is not sufficient evidence to say that increasing cost-share levels beyond 60 percent will affect willingness to participate; 3) Landowners are more likely to participate when pine is present on adjacent ownerships. Targeting areas with abundant, contiguous pine ownership could boost program efficiency, and 4) Landowners with larger landholdings are more likely to participate, and represent another potential target to boost program efficiency. This research was funded by VDOF through our federal SPB Prevention Program (USDA Forest Service Forest Health Protection) grant.



GYPHY MOTH

The gypsy moth, as predicted, produced no significant defoliation this year that could be detected through aerial survey. Populations will likely remain low at least for the next two years. Consecutive dry spring weather will result in an upsurge in populations. For the last few years, however, May has been a wet month, which means the fungus *Entomophaga maimaiga* is able to thrive and attack larval populations when they are most vulnerable. Dead larvae mean few adult moths, and that in turn means few egg masses next year. Few egg masses mean no detectable defoliation.

EMERALD ASH BORER (EAB) TRAPPING

As reported in the last issue, the EAB trapping survey was expanded this year to cover a large swath of Virginia from the southwest to the east. More than 4,500 traps were placed in a 2x2-mile grid across this area by federal contractors

hired through USDA APHIS. While the federal survey excluded trapping in the northern Virginia counties under the quarantine, limited trapping was done in Prince William and Fairfax by those counties. While there were some positive traps in new locations, this occurred only in Fairfax and Prince William counties, among those where EAB was already known to be present (Figure 1). No new detections in new counties in Virginia have occurred to date based on the 2011 survey. That's the good news. The bad news is that similar survey efforts in adjacent states, such as Maryland and West Virginia, have shown a dramatic expansion in the number of known infested counties just in the last year, with the expansion in southern West Virginia bringing it very close to Buchanan County, Va. The Knoxville, TN, infestation has also crept farther north by another couple of counties and is right on the doorstep of Lee County, Va. Based on these developments, my guess is the next infested location in Virginia will be somewhere in the Southwest.

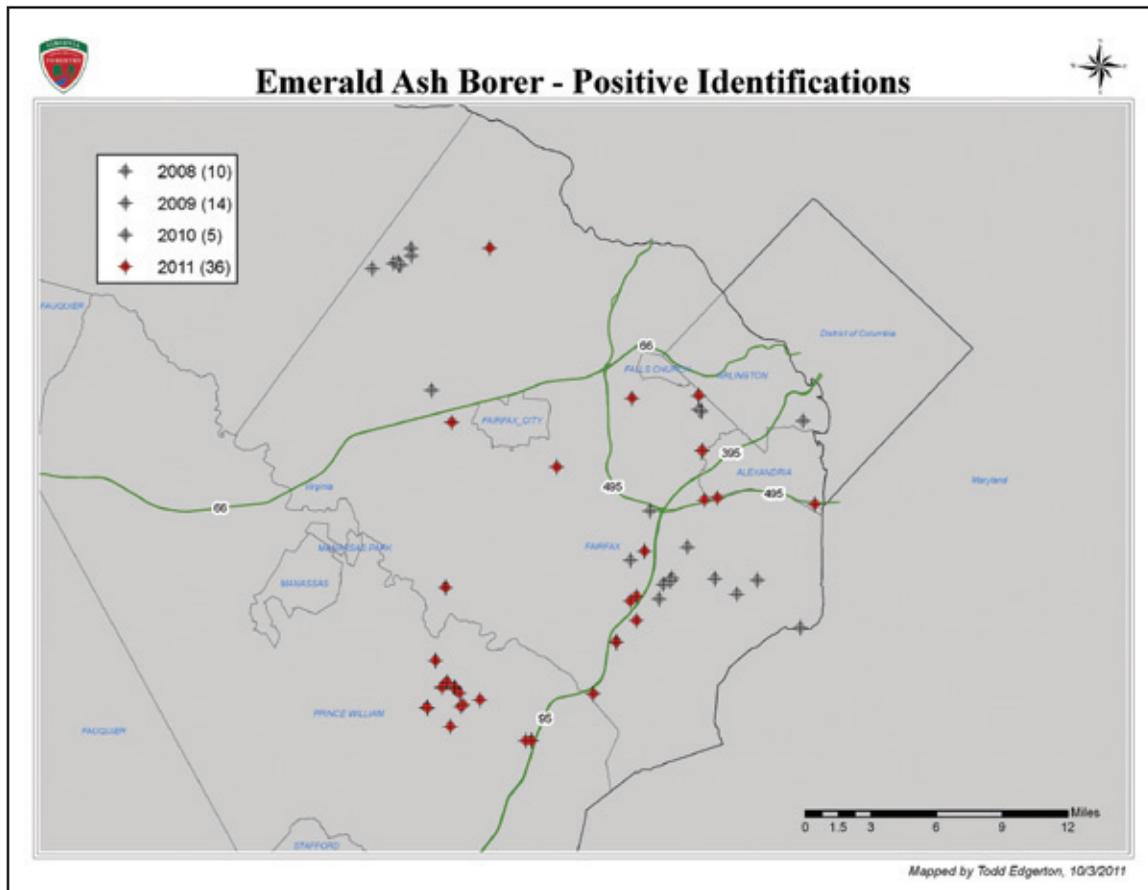


Figure 1

UPDATES

EMERALD ASH BORER WORKSHOP IN ABINGDON

To help spur awareness of EAB in southwestern Virginia, Paul Revell (VDOF Urban and Community Forestry program manager), Kevin Sigmon (arborist for the City of Abingdon) and I helped put on a one-day EAB workshop in August at the Southwest Virginia Higher Education Center in Abingdon. We had excellent attendance at more than 100 folks, including about 25 or so VDOF employees from the region. The speakers and field demonstrations in the afternoon were excellent, and attendee feedback was very positive. We even had some local TV media coverage for the event. Abingdon has some very large and historic ash trees right in the heart of downtown and is already treating them with systemic chemicals to proactively limit the risk associated with EAB. Even though EAB has not been found in the area yet, we know we are often years behind when it comes to detection compared with EAB's arrival to a new area, so I think in Abingdon's situation this is a sensible thing to do. The other advantage to doing early preventative control is that by going through the motions you learn what is feasible and how much it costs. Plus, you're in an overall better position to react quickly once EAB does finally show up.



Dr. Don Booth (left, standing) of Bartlett Tree Experts demonstrates how to apply the systemic insecticide imidacloprid with a stem injection system.



Attendees of the EAB workshop gather around a large ash tree in downtown Abingdon to observe a demonstration on tree injection of a systemic insecticide.

DON'T MOVE FIREWOOD

With two active quarantines in place against emerald ash borer and now thousand cankers disease, respectively, the list of counties out of which untreated firewood may legally be moved to non-regulated areas is shrinking rapidly since firewood is regulated under both quarantines. These 12 counties (plus associated independent municipalities) include Frederick (and City of Winchester), Clarke, Loudoun, Fairfax (and cities of Alexandria, Falls Church and Fairfax), Arlington, Prince William (and cities of Manassas, Manassas Park), Fauquier, Henrico, Chesterfield, Hanover, Goochland, Powhatan and the cities of Richmond and Colonial Heights.

INVASIVE WEED CONTROL ON MATTHEWS STATE FOREST

I recently visited the Matthews State Forest in Grayson County with Zach Olinger, the VDOF state forest manager for the southwest. Zach showed me a number of locations where oriental bittersweet was presenting a real problem, including a mature stand of white pine that was nearing a harvest, as well as some high-quality stands of oak-hickory. In another section of the forest, Japanese barberry was also becoming a real issue. Fortunately, we received a modest but significant pool of money this year from the USDA Forest Service Forest Health Protection office to deal with invasive plants on our state forests, and I was happy to provide some of this funding to the Matthews. We will also use some of this money to follow up on projects began some years ago on the Whitney, Lesesne and Paul state forests in northern Virginia.



A mature stand of white pine at Matthews State Forest with a heavy presence of Japanese barberry in the understory.



Oriental bittersweet carpets the understory at Matthews State Forest.



Japanese barberry

VIRGINIA ASSOCIATION OF FOREST HEALTH PROFESSIONALS MEETING

The next meeting will be held February 6-7, 2012, at the Stonewall Jackson Hotel in Staunton, VA. Speaker topics will include thousand cankers disease, emerald ash borer, Asian longhorned beetle, sudden oak death, hemlock woolly adelgid, tree-of-heaven, chestnut restoration, the Virginia DCR Natural Heritage Program, the George Washington National Forest management plan, and more! This meeting is a good opportunity to obtain full pesticide recertification credits as well as SAF and ISA credits. Registration by all VDOF employees will be covered by me. Stay tuned for more details.



TORNADOES, HURRICANES, FLOODS AND AN EARTHQUAKE, TOO



Tornado damage from an EF2 in southwest Shenandoah County that touched down on April 28, 2011.

Virginia was beset with storms this year, from spring tornado outbreaks to late summer tropical systems, such as Hurricane Irene and Tropical Storm Lee. Tornadoes touched down in many places this spring, with areas that were particularly hard hit including the Town of Pulaski, City of Abingdon and numerous areas throughout Washington, Halifax, Rockingham, Shenandoah, Dinwiddie, James City, York, Gloucester and Middlesex counties. During the most severe tornado outbreak in Virginia, which occurred April 27-28, the National Weather Service confirmed 16 tornadoes. Of those, four were rated EF0, eight EF1, three EF2 and one EF3 in Washington County that was three quarters of a mile wide and touched down for 18 miles. While many communities were hard hit, aerial surveys revealed that overall forest damage was not too extensive, with the exception of some localized pockets of severe blowdown. In total, our staff reported 1,246 acres of damaged forest throughout Virginia, although this is likely a considerable underestimate.

Hurricane Irene blew through eastern Virginia over the August 26th-28th weekend, maintaining category 1 strength most of the way. While there were widespread power outages due to downed trees and considerable flooding in places, it could have been much worse. Subsequent aerial survey revealed no

widespread catastrophic damage to core forested areas in general. Our folks reported a little more than 450 acres of forest damage, although reporting was spotty and likely to be underestimated considerably. Most places east of I-95 saw at least five inches of rain, while parts of five counties in southeastern Virginia saw 11 to 15 inches (Figure 2). To add insult to injury, less than two weeks later Tropical Storm Lee came straight up the I-95 corridor and dumped another five to 15 inches of rain in many locations in the northern coastal plain and northeastern piedmont (Figure 3). This resulted in a number of places receiving up to 20 inches of rain in a two-week period.



Aerial survey view of tornado damage from an EF2 in southwest Shenandoah County. Photo by Justin Barnes, VDOF county forester.

While wind damage and storm surge in coastal areas is often the greatest concern when it comes to tropical systems, it is often persistent flooding that leaves the worst legacy, both to homes and structures as well as forest health. One of the legacies of Hurricane Isabel in 2003 was the flooding it caused and the gradual tree decline and mortality that occurred over the next five years due to this flooding. Many trees, particularly some species of oaks that aren't well adapted to being in standing water for days or weeks, eventually succumb to flooding events. Roots in flooded soils are deprived of oxygen and begin to dieback. Subsequent drought periods added further stress to trees that had lost much of their fine root system due to previous flooding and were now less able to extract water from the ground when it was most needed. This leads to crown dieback and further weakening of

TORNADOES, HURRICANES, FLOODS AND AN EARTHQUAKE, FROM PAGE 10

the tree to the point where insects and diseases, such as two-lined chestnut borer, shoe-string rot, hypoxylon canker and ambrosia beetles are able to overcome the tree's defense system. I witnessed a lot of this latent mortality going on up to five years post-Isabel, and hardwood volume reductions in southeastern Virginia were even noted for that period in the FIA inventory data. I anticipate similar trends in hardwood decline from the latest flooding, perhaps on a smaller scale than from Isabel, which was a much more serious storm.

With all the meteorological drama seen this year, I would be remiss if I did not mention the magnitude 5.9 earthquake August 23rd, which was centered in Mineral but was felt as far north as Canada and as far south as Atlanta. Mineral experienced severe structural damage, and even Washington, DC, did not escape unscathed, with damage to the Washington National Monument and the plumbing in the Pentagon. Those of us in the headquarters building in Charlottesville were alarmed by the pretty violent shaking and noise produced by the quake, even though it caused no structural damage here and you could hardly detect anything once you stepped outside (which we all did in a big hurry). A few witnesses who were outside the building during the quake thought we had a fire alarm when they saw everyone suddenly emerge from the building – most felt nothing.

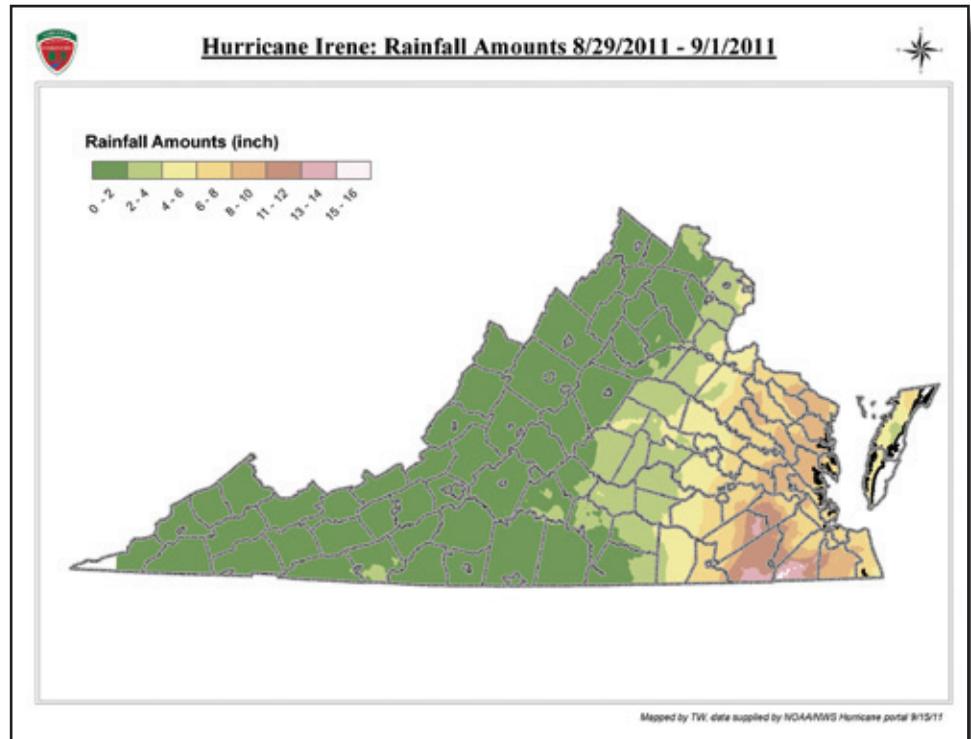


Figure 2

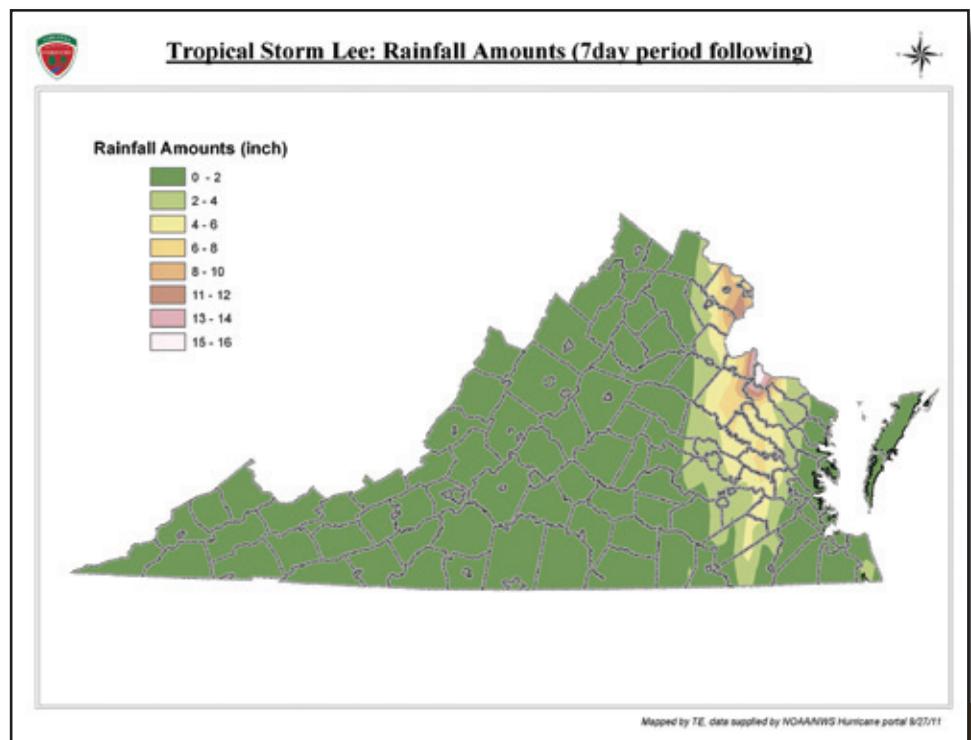


Figure 3

THOUSAND CANKERS DISEASE OF BLACK WALNUT, FROM PAGE 3

may be present where there are numerous beetle attacks. These individual cankers may coalesce into larger areas of infection, eventually girdling the twig or branch until it dies. Because cankers are relatively small and slow to expand, it takes many beetle attacks over many years on a large tree before initial symptoms begin to show. Once symptoms of disease and dieback become obvious to most people, the tree often will have been under attack for as long as five to 10 years or more. However, once these symptoms do appear obvious, the tree has only a few years to live at the most. Therefore, it is very difficult to detect this disease in its earliest phases, and detections thus far have seemed to lag many years behind likely arrival times. The more people begin to look for TCD, I believe it will be discovered in more and more localities across Virginia and probably throughout the eastern U.S.

While early detection will be a considerable challenge, one tool that may assist with this effort is pheromone trapping. A putative pheromone for the walnut twig beetle has been identified by Dr. Steve Seybold, a USDA Forest Service research scientist with the Pacific Southwest Research Station in Davis, CA. While still in the testing phase, trapping studies this summer in Virginia and elsewhere showed there is a strong attraction by walnut twig beetle to traps baited with the alleged pheromone. Traps closer to Richmond caught a large number of beetles, while the number caught declined to 0 at approximately 30 miles outside the urban center of Richmond. A tool such as this will be extremely valuable in the future for more precisely delineating the location of walnut twig beetle and, by association, TCD. We will need such tools if we have any hope of staying ahead of this problem.



Branch dieback associated with attack by walnut twig beetle and *Geosmithia morbida*.



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